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(a) TECHNOLOGY FOR SMALL-SCALE ECONOMIC ACTIVITIES TO ADDRESS THE BASIC NEEDS OF LOW-INCOME POPULATIONS

(b) THE GENDER IMPLICATIONS OF SCIENCE AND TECHNOLOGY FOR DEVELOPING COUNTRIES

(c) THE SCIENCE AND TECHNOLOGY ASPECTS OF THE SECTORAL ISSUE TO BE DISCUSSED BY THF COMMISSION ON SUSTAINABLE DEVELOPMENT IN 1995

Overview of the reports of Panels

The attached document contains an overview of the reports of the panels which dealt with the substantive themes under item 2 of the provisional agenda:

(a) Report of the Panel on Technology for Small-scale Economic Activities to Address the Basic Needs of Low-income Populations (E/CN.16/1995/2);

(b) Report of the Panel on Gender Implications of Science and Technology for Developing Countries (E/CN.16/195/3) and

(c) Report of the Panel on the Science and Technology Aspects of the Sectoral Issues to be discussed by the Commission on Sustainable Development in 1995 (E/CN.16/1995/4).

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PREFACE

In pursuance of Economic and Social Council decision 1993/320, the Commission on Science and Technology for Development established Panels consisting of its own members to carry out an in-depth examination of the substantive themes that were identified at its first session, namely basic needs, gender issues, land management and R&D systems, and to report to the Commission on their findings. The final reports of the three Panels are presented as separate documents (see note on cover page).

This overview deals with recent changes in the global order which have a direct bearing on science and technology for development, and sets out the background against which the issues identified by the Commission are examined. The overview has been prepared by the Chairman of the Commission and Bureau members with the assistance of the United Nations secretariat, and on the basis of a background paper prepared by Mr. Francisco R. Sagasti. Financial contributions by a number of Governments, foundations, institutions and individual donors to the work of the Panels is gratefully acknowledged.

Introduction

1. The transition to the twenty-first century is witnessing the emergence of a new world order that is global but not integrated; an order that puts most of the world's population in contact with one another, but simultaneously maintains deep fissures between different groups of countries and between peoples within countries; an order that concentrates "global" activities in certain countries, regions, cities and even neighbourhoods, while increasingly marginalizing many productive and service activities and the people engaged in them. The multiplicity of changes and trends that can be observed at present indicate that there is an accelerated, segmented and uneven process of globalization under way. The range and diversity of changes in many aspects of the international economy appears much larger at this juncture than at any time during the last four decades.

2. At the root of this global transformation lie scientific advances and technological innovation, acting as enabling factors and exerting pressure towards further globalization. At the same time, however, changes in the political, economic, social and environmental fields have stimulated and supported the growth of science and technology activities, and have shaped the particular direction of their evolution.

3. A brief examination of the main changes that are taking place may help to: (a) appreciate the extent and depth of the transformation in the global order; and (b) establish the background against which the Commission on Science and Technology for Development has selected the substantive themes for its inter-sessional work and reveal the common threads running through those themes.

4. The major transformations taking place in the patterns of world economic interdependence include, among others, the rapid growth and globalization of financial markets, fundamental changes in trade patterns, and a deepening of inequalities between rich and poor countries and men and women. Growing interdependence and globalization - to some extent a consequence of advances in communications and information technologies - have created opportunities but also challenges.

5. International financial markets now comprise a tight web of transactions involving global securities trading, arbitrage in multiple markets and currencies, portfolio investments through a bewildering array of international funds, and massive transborder capital movements. There have also been changes in the direction and content of international trade, as exemplified by the rise of regional trading blocks, such as the European Union and the North American Free Trade Agreement; the adoption of the Marrakesh Agreement; and the shift away from primary commodities, exported mainly by developing countries, towards high-technology services and manufactured products that are usually exported by industrialized nations.

6. Concomitant with the increasing interdependence of the world economy, political pluralism, popular participation and democratic movements are rapidly becoming a fact of life. However, as persistent conflicts in countries with vastly differing political and economic backgrounds have indicated, advances towards democracy, respect for human rights and peaceful coexistence are by no means guaranteed. Be that as it may, the new international political context is altering the balance in favour of democratic forms of governance.

7. In this connection, it should be noted that in recent years the issue of governance has come under strain in both the industrialized and developing countries, albeit for differing reasons. Whereas in the former countries the causes may be traced to the changing norms of political and economic life, in the latter the related problems have been intensified by the sharp contrast between the growth in social demands and the capacity of the institutional framework - including the institutions of the State, the private sector and the civil society - to satisfy them. Governance and appropriate systems of government have also emerged as an area of concern for international development organizations, in the wake of the realization that many projects supported with external financial and technical resources failed to yield the anticipated rates of return. One reason was that investments were made in highly distorted policy environments, which prevented benefits from materializing.

8. The most worrying feature of the current globalization process is the widening fissure between the very poor - representing approximately 20 per cent of the world's population - and the remaining majority. Despite improvements in life expectancy and standards of living in many parts of the world during the past several decades, there remain enormous and persistent economic differences between regions and countries, and particularly between the industrialized and developing nations. The absolute number of poor people in the world has continued to increase and disparities between the rich and the poor have widened even further. In developing countries, the growth in social demands has been triggered largely by population increases during the last four decades. Coupled with a significant slow-down in population growth in the industrialized nations, this has led to a highly skewed world-wide distribution of social needs and of the capabilities to satisfy them.

9. The dynamics of population growth strongly condition the demand for food, education, employment, housing and other social needs. Food and nutrition demands have multiplied many times over, particularly in the poorest countries; demand for basic health care and elementary education has expanded at a rapid pace; and unemployment has emerged as perhaps the most troublesome and persistent problem.

10. Another prominent and disturbing feature of the global social situation is the difference in social and economic indicators between men and women throughout the world. Despite continued efforts dedicated to women, gender discrimination remains widespread. In industrialized countries, gender discrimination appears in employment and wages, and in developing countries the greatest disparities, besides the job market, are to be found in education, health care and nutritional support. These disparities persist despite clear acknowledgement of the pivotal role which women play in education, health and the running of the household.

11. Environmental concerns have also been placed at the top of the international public policy agenda during the past two decades. There is greater awareness of the limits that the regenerative capacity of natural ecosystems impose on human activities, as well as of the dangers from the uncontrolled exploitation of natural resources (fisheries, forests, land, rivers), and from overloading the capacity of the earth to absorb waste (air and water pollution, acid rain, toxic and nuclear wastes). The 1980s and 1990s witnessed the emergence of truly global environmental problems such as depletion of the ozone layer and global warming, which underscore the possibility that unforeseen ecological instabilities could cause irreversible environmental damage.

12. The problems of environmental sustainability and resource use are closely related to population growth and poverty in the developing countries, and to the often wasteful consumption habits of the rich nations. Major changes in life-styles will be essential in both groups of countries to address the problem of environmental sustainability in the transition to the twenty-first century.

13. The Earth Summit in Rio de Janeiro in 1992 endorsed "Agenda 21", a wide-ranging world programme of action to promote sustainable development, though further negotiations on its implementation have brought to the fore the divergence of perspectives between industrialized and developing nations on approaches to sustainable development. Nevertheless, there is a consensus on the need to tackle the immediate environmental problems facing developing countries through cooperative actions and the application of science and technology.

14. Since the Second World War the products of scientific research and technological innovation have become more and more deeply enmeshed in all aspects of human activity and there have been wide-ranging modifications in the way knowledge is generated and utilized. Unfortunately, however, very little of the power of modern science and technology has been directed at development. Moreover, the science and technology capabilities of developing countries continue to be too limited to deal adequately with the enormous existing problems of development. Only about 4 per cent of world expenditure on research and development and about 14 per cent of the world's supply of scientists and engineers are in developing countries, which contain more than 80 per cent of the world's population. These differences, which have persisted over a long time, constitute a distinguishing feature of the evolving global order. The role that knowledge currently plays in the process of development is so critical that development itself could be redefined in terms of the capacity to generate, acquire, disseminate and utilize knowledge, both modern and traditional. The presence or absence of this capacity constitutes a crucial divide between nations.

15. Two aspects of science and technology merit further attention in the transition to the twenty-first century: the changes taking place in the conduct of scientific research, and the increasingly complex character of technological innovation.

I. Scientific research

16. There has been significant cross-fertilization between scientific research, technological innovation and commercial exploitation of research results. Moreover, the institutional settings for the conduct of basic research, applied research, and the development of new products and processes are experiencing significant changes, particularly because of shifts in the sources of funding and a more prominent role for the private sector. Links between universities and industries are being strengthened, collaborative industrial research and technological alliances have become an imperative in certain fields, and venture capital firms and some specialized government agencies are playing an increasingly important role in providing capital for new technology business.

17. However, these very mechanisms have also become the Achilles' heel for the developing countries. The closer links between scientific capacity, developments in technology and economic growth, the increasing costs of scientific research, the emergence of new transdisciplinary fields, and the growing complexity of the institutional setting for the conduct of research are making it more difficult for them to push quickly towards the frontiers of knowledge and take advantage of scientific and technological advances. At the same time, the slow-down in the rates of economic growth, the severe resource constraints and the growing social demands are undermining the long-term efforts required to build scientific and technological capabilities in developing countries.

II. Technological innovation

18. The nature of the innovation process has also changed significantly, particularly in science-intensive industries. It has acquired a more complex character, becoming more expensive, involving greater sophistication in management techniques, intensifying both international collaboration and competition, and enlarging the role of Governments in the support of innovation. As a result, the costs of incorporating research results into productive and service activities, and of bringing new products to the market, have been steadily increasing during the past few decades. In addition, a well developed physical infrastructure is required to support innovation, including a good network of roads and transport facilities, telecommunications and data transmission networks, reliable electricity supply, access to waste disposal facilities, and clean water supply. These requirements, coupled with the higher costs of innovation and the larger risks faced by firms in a more competitive environment, have in effect increased barriers to entry in many fields of industry.

19. The above impediments aside, in the transition to the twenty-first century, the building of an appropriate level of scientific and technological capacity will continue to be an essential requirement of the development process. Without this capacity no country will be able to make the major decisions that affect its policies and strategies for achieving sustainable human development; absorb, adapt, and improve upon imported technology; or expect to develop its productive potential, even in those areas where it has competitive advantages.

III. The new challenge: sustainable human development

20. In summary, it should be stated that, though scientific and technological progress during the past century has freed much of humanity from dire poverty, the very poorest have not shared in the benefits. Indeed, the globalization of the world economy has broadened even further the gap between the poor and the non-poor. It is evident that wide disparities between countries in their ability to use modern technology and undertake innovative activities have led to an unequal degree of integration into the new global system. Consequently, the benefits of globalization are shared unevenly among nations and within nations, thereby increasing marginalization both domestically and internationally. The deepening economic stagnation in the low-income countries, more specifically the plight of the very poor and women, has given cause for concern to governments and international organizations alike. The issues identified by the Commission for Science and Technology for Development at its first session have reflected these concerns.

21. The challenge to the international community is how to support this most under-privileged group effectively, particularly women and the rural poor, and achieve sustainable human development. Efforts to meet this challenge imply a commitment to establish links that will provide all human beings, both individually and collectively, with the opportunity to realize their full potential. Above all, this implies a determination to embrace and put in practice a new conception of sustainable human development.

22. Sustainable human development could provide all individuals with equal opportunities to enlarge their human capabilities to the fullest possible extent and to put those capabilities to the best use in economic, social and environmental fields. However, two aspects should be emphasized: first that sustainable human development is not just for the developing countries but is also applicable to the industrialized nations as well; secondly, although science and technology can contribute a great deal to sustainable human development, they do not offer a ready-made solution to the problem of values that is raised by the clash between tradition and modernity. Therefore, from the perspective of science and technology, sustainable human development has to be considered as an uncertain quest in which the seekers rely heavily on the knowledge and on the innovations that are the product of modern science and technology while also seeking guidance from the wisdom and experience offered by traditional local knowledge systems.

23. It is against this background, and with the objective of tackling these pressing issues, that the Commission decided to address, in its inter-sessional work, the role of science and technology in the following areas: basic needs, gender and land management. To this end the Commission set up three Panels to analyse, respectively, "Technology for basic needs", "Science and development for sustainable human development: the gender dimension", and "An integrated approach to land management". Moreover, as a follow-up to an earlier report of the Secretary-General on the contributions of technology to industrialization and regional integration (E/CN.16/1993/2), a panel of experts was created to examine ways and means of strengthening "Linkages between the national R&D systems and industrial sector of developing countries".

24. These substantive issues were examined by panels of experts *cum* working groups in the context of the "new working style" adopted by the Commission in carrying out its inter-sessional work. Directors of Study were appointed to design and coordinate the work plan of some of the panels. This new style encourages debate among Commission members who are responsible for preparing inputs, drafting reports, and following up on recommendations. The United Nations Secretariat has acted as facilitator and has assisted in the finalization of the Panel reports.

25. The following sections contain an overview of the salient conclusions reached by afore-mentioned Panels.

IV. Technology for basic needs

26. The Panel on Technology for Basic Needs discussed how a fresh approach to science and technology could ensure that the basic needs of low-income populations are met. Basic needs are defined as those minimal requirements needed for sustaining life for all people. They encompass adequate nutrition, health services, water, and sanitary facilities. They also imply access to elementary education and information that will enable individuals and communities to participate in productive activities and use rationally the basic goods and services available. In the course of its work, the Panel addressed issues such as food production and processing, education - especially technical and vocational training -and health care. The Panel agreed that technology strategies, approaches and policies, rather than specific technologies, and a pragmatic and pluralistic approach rather than a doctrinaire stance should be given priority.

27. The rapidly evolving global order has affected the fundamental nature of the problem of poverty and, to a great extent, the possibility of realizing sustainable human development. The concern with technology transfer has now been superseded by a preoccupation with technology capacity-building. Moreover, the trend towards decentralization and democracy is widening and deepening the participation of the poor in the solution of their own problems, and is thus creating a better climate for linking the satisfaction of basic needs with human rights.

28. The fundamental objective of the mobilization of science and technology to meet basic needs should be to create conditions that increase the ability of the poor to gain access to, comprehend and use creatively knowledge and technology in order to satisfy their basic needs. In putting people at the centre of sustainable development, the report of the Panel places its recommendations under six integrating themes, namely education, health, participation, small-scale economic activity, basic infrastructure and access to information; it also formulates special recommendations for science and technology policy for basic needs.

29. The role of the United Nations in the implementation of the basic needs objective is crucial. In this connection, it is suggested that the United Nations: (a) promote and sponsor activities to sensitize the scientific and technological community and policy - and decision-makers to the issue of the contribution of science and technology for the satisfaction of basic needs; and (b) implement a mechanism for the evaluation of country science and technology policies with the aim of determining how adequately basic needs satisfaction is being addressed.

V. The gender dimension

30. The analysis of the Panel on the "gender dimension" of science and technology for sustainable human development was underpinned by the explicit recognition that development itself is gender-specific, and that science and technology for development must systematically and purposefully recognize this gender-specific nature of development in order to respond to the concerns, needs and interests of both women and men appropriately and equitably.

31. Unfortunately, the impact of science and technology on society has not been uniformly beneficial. Even at the close of the twentieth century, women in the developing countries, especially in the rural areas, are still experiencing serious difficulty in meeting their own basic needs, and the basic needs of their household. Scientific and technological interventions have improved many aspects of women's lives, allowing for important declines in both maternal and infant mortality. However, over the last three decades, women in developing countries have also become disproportionately poor in relation to men in their own communities. This difference between men and women worldwide cannot be understood without explicit reference to the gender-specific nature of development, including scientific and technological contributions to the development process.

32. There is also significant gender inequality in education and careers prospects for girls and women. This phenomenon is by no means confined to the developing countries: in most industrialized countries there are similar obstacles to girls and women receiving education, particularly in science and education, and in pursuing scientific and technical careers. The available data clearly demonstrate that women are under-represented in scientific careers and decision-making bodies in both the developing and industrialized countries.

33. The Panel on "the gender dimension" identifies many areas in science and technology in which the needs and aspirations of women have been relatively neglected. They include: the decision-making processes in science and technology; scientific and technical training; career prospects; the manner in which statistics are collected; ethical issues in science and technology; recognition of women's local knowledge systems; and the science and technology activities of the United Nations system.

34. The differential impact of new technologies, particularly information technologies, on women's and men's employment received particular attention. The results of a commissioned study suggest that in many cases new technologies have also made many existing jobs in manufacturing redundant or obsolete. These changes have affected men and women differently, but overall female labour has been displaced more than male labour. New jobs are more skill-intensive than old jobs and women have been at a disadvantage because of limited training opportunities for women compared to men.

35. The role of the United Nations in addressing gender issues and promoting better awareness of relationships between gender and science and technology is crucial. This could be achieved, *inter alia*, through initiation, monitoring and evaluating activities in this field; encouragement of recruitment of women in science and technology/sensitive positions; incorporation of gender analysis into the design of science and technology programmes; and strengthening of informal methods of inter-agency networking in this area.

36. Finally, seven "Transformative Actions" and a Declaration of Intent consisting of six goals for equity in science and technology have been formulated by the Working Group. All Governments are invited to subscribe to this declaration and to establish ad-hoc committees to formulate national action plans for its implementation.

VI. Integrated land management

37. The Panel dealing with science and technology for integrated land management focused on one of the most important issues in environment sustainability. The essential role of land and water resources in supporting all current and future human activities makes it necessary to consider the management of land resources as one of the primary tools of sustainable human development. The Panel agreed that the proper method of managing land is through a holistic and integrated approach. An integrated approach to land management is not a fixed procedure, but rather a continuous, iterative process of planning, implementation, monitoring and evaluation. The basic techniques for carrying out each of these steps are already available, but their application in many parts of the world is limited by training, financial and institutional constraints. Failure to manage land resources in an integrated manner could lead to: (a) permanent destruction or degradation of the land's capability to provide economic and environmental benefits; (b) inefficient use or waste of resources; and (c) cumulative effects that lead to trans-boundary problems.

38. Because land serves multiple functions in society, there are diverse social, economic, and environmental considerations that influence current and future land uses. Examining the potential uses of land in a systematic manner makes it possible to improve social and economic development, while simultaneously protecting and enhancing the environment. A fundamental goal of integrated land management is to use science and technology to prevent degradation of the land's capacity to support human activities, and particularly the production of food.

39. The Panel report shows that modern science and technology play a most important role in integrated land management through the use of: (a) advances in information technology to monitor and diagnose land uses; (b) evaluation technologies for interpretation and the identification of options for land use; (c) application technologies to use the land for specific purposes; and (d) supporting technologies for the provision of the infrastructure that allows for the efficient and sustainable use of land. However, one of the limitations is that the various technologies which can contribute to integrated land management and which have been developed in each of these areas are not available in the developing countries where they are most needed.

40. Four major barriers to effective global application of integrated land management methods are identified. These include: (a) limited access to appropriate technology and information; (b) lack of appropriate infrastructure to use science and technology effectively; (c) problems emanating from unsustainable land use practices; and (d) unresolved conflicts between different land use goals. Elimination of these barriers requires approaches specific to each country. The Panel identified four approaches that are useful for effective implementation of integrated land management: (a) pooling resources among countries with common interests through intra- and intergovernmental cooperation; (b) private/public partnerships in the area of credit provision, and research and development efforts; (c) targeted training and technology support programmes; and (d) direct public investment in resource protection, for example by building dykes and canals to prevent erosion and by planting trees to prevent wind erosion and desertification.

VII. R&D systems

41. In addition to the above three major panel discussions, the Commission also considered the issue of linkages between the national R&D systems and industrial sectors of developing countries and countries in transition. The Panel confirmed the view that the R&D systems in these groups of countries were not up to the task of promoting industrial development. A number of common weaknesses that characterize R&D systems in these countries were identified, including: (a) extremely low rates of R&D expenditure in relation to industrialized countries; (b) little or no R&D by the enterprise sector - which is the main agent in the innovation process; (c) public-sector R&D is fragmented and insufficiently oriented towards the needs of the industrial sector; (d) research and development institutes (RDIs) have not been successful in generating a sufficient volume of commercially applicable innovations; (e) excessive emphasis on basic, rather than applied research in RDIs; (f) scientists in RDIs tend to be more concerned with career prospects than with the needs of industry; and (g) lack of appropriate incentives for undertaking R&D.

42. Although most of these weaknesses were found to be common to publicly funded research and development institutions (RDIs) of developing countries and countries in transition, the situations of the two groups of countries were nevertheless different in so far as developing countries in general had a more articulated market mechanism favouring commercialization of R&D results whereas the countries in transition were better endowed with scientists and engineers able to carry out R&D.

43. While recognizing that the question of how, when and whether to intervene in favour of technological capability building is a contentious one, the Panel has singled out three sets of measures that are necessary to strengthen linkages between national R&D systems and productive sectors. First, an environment conducive to R&D and technological innovation should be created. This would involve establishing a stable economy and a competitive market environment. Secondly, some of the existing public RDIs should be transformed or restructured through increased commercialization and refocusing of RDIs' activities to make them more responsive to the needs of industry. Thirdly, R&D should be stimulated in the enterprise sector through the use of general measures (for example, tax and credit incentives, levies, subsidies, duty exemptions) and selective measures (for example, targeting).

VIII. Information technologies

44. Finally, the Commission, as part of its inter-sessional work, also considered the effect of information technologies in the development process. It is widely believed that information technologies have a generic influence in the development of modern technologies, thereby determining the pace of social and economic progress. However, the effects that these technologies have on the development process in general, and the technological advancement of developing countries in particular, are not yet fully understood. Given its increasing importance to the progress of science and technology, information technology is one subject that the Commission might wish to consider in its future work.